

WHAT IS CLAIMED IS:

1. A Raman amplifier, wherein:

in the Raman amplification method for expanding a gain wavelength band, there are provided two or more pumping wavelengths before expansion, and two or more pumping wavelengths are added for expanding the gain wavelength band, and at least one of the pumping wavelengths to be added is differentiated from the pumping wavelengths used before expansion, and at least one of the differentiated pumping wavelengths is positioned in bands of the pumping wavelengths used before expansion.

2. A Raman amplifier, wherein:

in the Raman amplification method for expanding a gain wavelength band, there are provided two or more pumping wavelengths before expansion, and two or more pumping wavelengths are added for expanding the gain wavelength band, and at least one of the pumping wavelengths to be added is differentiated from the pumping wavelengths used before expansion, and at least one of the differentiated pumping wavelengths is positioned in a band of a pumping wavelength having insufficient gain among bands of the pumping wavelengths used before expansion.

3. A Raman amplifier, wherein:

in the Raman amplification method for expanding a gain wavelength band, there are provided two or more pumping wavelengths before expansion, and one or more pumping wavelength is added to bands of the pumping wavelengths before expansion for expanding the gain wavelength band so that, by the addition, the pumping wavelengths within the bands of the pumping wavelengths before expansion are spaced apart from each other equidistantly or substantially equidistantly.

4. A Raman amplifier wherein:

when a C-band and an L-band are simultaneously amplified by simultaneously using two or more pumping wavelengths for amplifying the C-band and two or more pumping wavelengths for amplifying the L-band, one or more pumping wavelength different from the pumping wavelengths for the C-band used before expansion is added to bands of the pumping wavelengths for the C-band.

5. A Raman amplifier wherein:

when a C-band and an L-band are simultaneously amplified by simultaneously using two or more pumping wavelengths for amplifying the C-band and two or more pumping wavelengths for amplifying the L-band, one or more pumping wavelength different from the pumping wavelengths for the C-band used before expansion is added to a band of a wavelength having insufficient gain among bands of the pumping wavelengths for the C-band.

6. A Raman amplifier wherein:

when a C-band and an L-band are simultaneously amplified by simultaneously using two or more pumping wavelengths for amplifying the C-band and two or more pumping wavelengths for amplifying the L-band, one or more pumping wavelength different from the pumping wavelengths for the C-band used before expansion is added to bands of the pumping wavelengths for the C-band so that, by the addition, the pumping wavelengths within the bands of the pumping wavelengths before expansion are spaced apart from each other equidistantly or substantially equidistantly.